Analysis of facet joint fluid on MRI and its relationship to instability in degenerative spondylolisthesis and outcomes following surgery

Linton T. Evans MD; Stuart Scott Lollis MD; Jon Lurie MD; Stephen Guerin; David Pastel
Dartmouth Hitchcock Medical Center

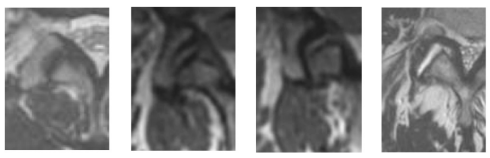
Introduction

Degenerative spondylolisthesis(DS) results from loss of integrity of discoligamentous structures and facet joints. A number of studies examined increased facet fluid on T2-weighted MRI and spondylolisthesis concluding that there is a correlation between incidental facet fluid and instability at the corresponding level. This has been invoked as a predictor of mobility. We review the SPORT database, a randomized trial of surgical versus non-surgical treatment for DS focusing on the correlation of facet fluid with radiographic instability and outcome.

Methods

Post-hoc analysis of the SPORT database. Individuals with DS at L3-L4 or L4-L5, neurogenic claudication or radiculopathy, and associated neurologic deficit were eligible. Patients were randomized to non-operative or surgical management. The pre-operative MRI was independently reviewed by two blinded neuroradiologists, grading the presence of facet fluid on a scale with proven interreliability from 0(no fluid) to 3(large). Instability was assessed using flexion-extension x-rays defined as >10 degrees of angulation or 4mm of translation. Blinded outcome assessments included SF-36 bodily pain, SF-36 physical function, Oswestry disability index, and back pain bothersome index. Student's t-test was applied for analysis of significance with alpha of 0.05.

Effusion Grade



Results

128 patients met inclusion criteria. 125 patients had any fluid at the spondylitic level but was moderate to large in 71. The presence of increased facet fluid was not associated with a worse baseline functional status or symptom type. Additionally, there was not a significant between group difference in instability on flexion-extension xrays.

Facet Grades (n=128)

0-1	57
2-3	71

Baseline Demographics

	Effusion grade		P-value
	0-1	2-3	
Age	63.8	66	0.25
Female	40 (70%)	45 (63%)	0.53
Symptom duration > 6m	42 (74%)	42 (59%)	0.13
Flex-ex instability	2 (4%)	8 (11%)	0.20
SF-36 Bodily Pain	33.5	35.5	0.57
SF-36 Physical Function	37.5	35.8	0.65
Oswestry Disability Index	42.5	40	0.53
Back pain bothersome index	4.5	4.1	0.24

80 of the 128 patients underwent operative intervention. Instrumented fusions were performed in 68% of patients with grade 0-1 facet effusions and 80% of those with grade 2-3 facet effusions.

Treatment

Nonoperative	48	
Operative	80	
	Effusion grade	
	0-1	2-3
Decompression only	1 (3%)	2 (4%)
Non-instrumented fusion	10 (29%)	7 (15%)
Instrumented fusion	23 (68%)	37 (80%)

There was no observed increase in the rate of pseudoarthrosis, recurrent stenosis or progressive spondylosthesis between the two groups. Additionally clinical outcomes were assessd with the SF-36 bodily pain, SF-36 physical function, oswestry disability index, and back pain bothersome index. On average there was improvement between the pre- and post-operative scores for both groups. The degree of improvement in clinical outcomes following surgery on average was greater for the 0-1 group, but did not reach significance.

Outcomes

	Effusion grade		P-value
	0-1	2-3	
Recurrent stenosis/ progressive spondylolisthesis	3 (9%)	2 (4%)	0.24
Pseudoarthrosis	0	0	
SF-36 Bodily Pain	33.3	28.1	0.079
SF-36 Physical Function	26.7	21.2	0.056
Oswestry Disability Index	-24.2	-20.2	0.062
Back pain bothersome index	-2	-1.8	0.19

Conclusions

- Increased facet fluid is not associated with a worse baseline functional status or symptom type
- Increased facet fluid does not predict overt instability
- Facet effusions do not predict post-operative pseudoarthrosis or clinical outcomes

Learning Objectives

By the conclusion of this session, participants should be able to discuss 1. the appearance of facet joint fluid on MRI; 2. the correlation between increased facet fluid and instability; 3. the correlation between increased facet fluid and surgical outcomes for DS; 4. the SPORT trial for DS

References

1. Birkmeyer, NJ, et al: Design of the Spine Patient Outcomes Research Trial (SPORT). Spine (Phila PA 1976) 27: 1361-1372, 2002
2. Caterini, R, et al: The correlation between exaggerated fluid in lumbar facet joints and degenerative spondylolisthesis: prospective study of 52 patients. J orthop traumatol 12:87-91, 2011
3. Chaput C, et al: The significant of increased fluid signal on magnetic resonance imaging in lumbar facets in relationship to degenerative spondylolisthesis. Spine (Phila Pa 1976) 32: 1883-1887, 2007
4. Oishi, et al: Smaller facet effusion in association with restabilization at the time of operation in Japanese patients with lumbar degenerative spondylolisthesis. J Neurosurg Spine 12:88-95, 2010
5. Weinstein JN, et al: Surgical compared with nonoperative treatment of lumbar degenerative spondylolisthesis. Four-year results in the Spine Patient Outcomes Research Trial (SPORT) randomized and observation cohort. J Bone Joint Surg Am 91: 1295-1304, 2009